



Appl. No. 10/028,118

— Brief

Brief following Appeal of 6 July 2004

Page 1 of 16

**IN THE UNITED STATES PATENT AND TRADEMARK
OFFICE BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Appl. No. : 10/028,118
Appellant(s) : KANE, Robert
Filed : 21 December 2001
Title : SEALED ENCLOSURE FOR A WIRE-
GRID POLARIZER AND
SUBASSEMBLY FOR A DISPLAY
SYSTEM
TC/A.U. : 2872
Examiner : CURTIS, Craig
Atty. Docket : PHUS 010688

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On: Sept. 7, 2004

By: John C. Fox

APPELLANT'S APPEAL BRIEF

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This Brief of Appellant follows a Notice of Appeal, dated 6 July 2004, appealing the decision dated 8 April 2004, of the Examiner finally rejecting claims 1-13 of the application. All requisite fees set forth in 37 CFR 1.17(c) for this Brief are hereby authorized to be charged to Deposit Account No. 501850.

REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of all rights in and to the subject application, Koninklijke Philips Electronics, N.V. of The Netherlands.

RELATED APPEALS AND INTERFERENCES

To the best of the knowledge of the undersigned, no other appeals or interferences are known to Appellants, Appellants' legal representatives, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Of the original claims 1-13, claims 1, 5, 6 and 8 were amended. Claims 1-13 stand finally rejected as set forth in the final Office Action dated 8 April 2004, and are the subject of this appeal.

STATUS OF AMENDMENTS

No amendment to the specification and/or claims was offered subsequent to the Final Office action. All amendments have been entered.

SUMMARY OF THE INVENTION

This invention relates to the protection of an environmentally-sensitive polarizer, and more particularly relates to a wire-grid polarizer for use in a display system employing a liquid crystal light modulator. (Specification, page 1, first paragraph)

Display systems employing certain types of liquid crystal light modulators rely on a polarizing beam splitter (PBS) to direct input light of predominantly one polarization state to the light modulator panel. In particular, the type of light modulator (or light valve) known as a 'liquid crystal on silicon' (LCoS) reflective device requires the illuminating beam to be linearly polarized. (Specification, page 1, second paragraph)

The light modulator panel is composed of an array of individual picture elements or pixels defined by a reflective layer, a liquid crystal layer atop the reflective layer, and a row-and-column matrix of control electrodes. The control electrode circuitry is integrated into a silicon substrate below the reflective layer. (Specification, page 1, third paragraph)

The polarization of the light incident on the array is altered on a pixel-by-pixel basis by the action of local electric fields on the birefringence of the liquid crystal in accordance with a display signal applied via the control electrodes. The light of altered polarization is then passed by the PBS to the projection optics. (Specification, page 1, fourth paragraph)

In conventional systems the PBS is usually of the MacNeille prism type which is prone to stress-birefringence, due to stresses arising from differential thermal expansion of regions heated and unheated by the illuminating beam, exacerbated by the relatively large dimensions of the PBS which make temperature uniformity difficult to achieve and which lead to development of noticeable levels of optical retardance. Although the physical effect can be slight, on the order of nanometers or tens of nanometers, the optical consequences are clearly visible as alterations in the

polarization state of the light, leading to non-uniformities in the output. The effect is especially noticeable in the dark state, showing up as lighter patches on a nominally black display screen. (Specification, paragraph bridging pages 1 and 2)

The problem may be overcome by replacing much of the glass in the prism with a liquid, which does not exhibit stress-birefringence and allows temperature gradients to be homogenized by convection. A simpler solution is to use a wire-grid polarizing beam splitter of the type described in United States Patent 6,243,199. Such a beam splitter has a parallel array of thin, elongated elements spaced on the order of wavelengths of visible light on a transparent substrate, which array interacts with waves of the incident light to transmit light of one polarization and reflect light of the other polarization. (Specification, page 2, first full paragraph)

When the wire grid is formed of finely-spaced aluminum lines on a glass substrate by photolithographic techniques, reflective liquid crystal display devices using the wire-grid polarizing beam splitter are capable of producing display images of higher contrast than systems using the conventional PBS of the MacNeille prism type, due at least in part to the freedom of the wire-grid polarizer from stress-birefringence. (Specification, page 2, second full paragraph)

Unfortunately, the aluminum wire-grid polarizer is unstable in normal ambient atmospheres over expected projector lifetimes, due to the susceptibility of the very thin — on the order of 200 nm — lines of pure aluminum to corrosion by contact with even trace amounts of reactive atmospheric components. Oxygen and water vapor are expected to be the principal sources of degradation, but other species in the environment are also likely to be a problem, particularly sulfur compounds relatively abundant in urban atmospheres. The wire grid must also be protected from handling, such as may occur in projector assembly, service, etc. (Specification, page 2, last paragraph)

Due to the very delicate nature of the wire grid and the critical dependence of its structure on its optical properties, a satisfactory protective coating has not yet been developed. Thus, the excellent performance characteristics of this type of PBS

are subject to significant degradation over time, preventing use of this type of PBS in a commercial display system. (Specification, page 3, first full paragraph)

In accordance with the invention, the wire-grid polarization beam splitter 13 is sealed in an enclosure 16 having a non-reactive atmosphere 17 such as an inert gas, nitrogen or vacuum. (Specification, page 3, second full paragraph)

The enclosure 16 may advantageously be a housing (30, 40) which also supports other optical components such as the light modulator panel 44 and one or more lenses (47) of a liquid crystal display system. Such a housing (30, 40) may have faces (31, 32, 33; 43, 46, 49) with mounting apertures (34, 35, 36; 42, 45, 48) into which the PBS 41 and other optical components (44, 47) are sealed. This arrangement eliminates the need for separate mounts for the polarizer 41, the panel 44 and the lens 47, and is advantageously used as a last-stage sub-assembly for a liquid crystal display system for data display, cinema, or television. (Specification, page 3, third full paragraph)

According to one aspect of the invention, a light polarizing device 13 comprises a polarizing element having an optically transparent substrate 14, an environmentally sensitive polarizing element such as a wire-grid polarizing element 15 on the substrate 14, and a sealed enclosure 16 surrounding the polarizing element, the enclosure maintaining a non-reactive atmosphere 17 to protect the polarizing element from the ambient environment. (Specification, page 3, fourth full paragraph)

According to another aspect of the invention, a light polarizing device 20 comprises an optically transparent substrate 21, an environmentally sensitive polarizing element 22 on the substrate 21, an optically transparent cover sheet 23, a plurality of spacers 24 distributed around the periphery of the substrate 21 and supporting the cover sheet 23 spaced above the element 22, a sealant 25 extending around the periphery of the device 20 between the substrate 21 and the cover sheet 23, and a non-reactive atmosphere 26 filling the interior space between the substrate 21 and the cover sheet 23 and protecting the environmentally sensitive polarizing element 22. (Specification, paragraph bridging pages 3 and 4)

According to a third aspect of the invention, there is provided a sealable housing 30 for use in a sub-assembly for a display device, the sealable housing 30 comprising a plurality of mounting apertures (34, 35, 36) for optical elements. (Specification, page 4, first full paragraph)

Advantageously, the sealable housing 30 is a wedge-shaped enclosure having three face portions (31, 32, 33) extending between triangular top (37) and bottom (38) portions, each face (31, 32, 33) having a mounting aperture (34, 35, 36) for an optical element or device. (Specification, page 4, second full paragraph)

According to yet another aspect of the invention, an environmentally sensitive polarizing device 41, a light modulator panel 44 and a lens 47 are sealed into the sealable housing 40 to form a sub-assembly for a display device. (Specification, page 4, third full paragraph)

ISSUES

The issues on appeal are:

1. Is claim 1 unpatentable under 35 USC 103(a) over Olympus (JP 10208284) in view of Taylor et al. (US 5,299,043) (herein 'Taylor')?
2. Is claim 2 unpatentable under 35 USC 103(a) over Olympus in view of Taylor and further in view of Shimizu et al. (US 6,511,183) (herein 'Shimizu')?
3. Is claim 3 unpatentable under 35 USC 103(a) over Olympus?
4. Is claim 4 unpatentable under 35 USC 103(a) over Olympus in view of Shimizu?
5. Are claim 5-7 unpatentable under 35 USC 103(a) over Kizawa et al. (JP 405300416 A) (herein 'Kizawa')?
6. Are claims 8-10, 12 and 13 unpatentable under 35 USC 103(a) over Dreyer et al. (US 5,504,544) (herein 'Dreyer')?

7. Is claim 11 unpatentable under 35 USC 103(a) as being unpatentable over Dreyer in view of Shimizu?

GROUPING OF CLAIMS

1. Claims 1, 2, 3, 4 and 11 each stand alone.
2. Claims 5-7 stand or fall together.
3. Claims 8-10, 12 and 13 stand or fall together.

ARGUMENT

1. Is claim 1 unpatentable under 35 USC 103(a) over Olympus in view of Taylor?

Claim 1 is rejected under 35 USC 103(a) over Olympus in view of Taylor.

Olympus discloses an optical head for a disk drive, including a semiconductor laser (21), an optical element (22) with a polarizing film (30) formed in the upper surface of the optical element. The optical head is provided with an airtight seal, apparently by means of a housing (42).

Olympus does not disclose or suggest a sealed enclosure only for the polarizing film.

Taylor shows an underwater LCD apparatus having an LCD (10) and a printed circuit board (92) sandwiched together and sealed inside a water-tight transparent enclosure (84, 86). The LCD (10) includes a liquid crystal cell (20) and matting (50) surrounding the cell (20).

Looking at Fig. 2 of Taylor, it can be seen that the front surface of liquid crystal cell (20) includes polarizer (30) positioned on an optically transparent substrate in the form of glass plate (22). This front surface is adjacent to transparent cover sheet (86).

However, neither cover sheet (86) nor any part of the remainder of the enclosure (84) is in contact with or sealed to glass plate (22).

Another polarizer (36) is located on another glass plate (24). However, neither cover sheet (86) nor any part of the remainder of the enclosure (84) is in contact with or sealed to glass plate (24).

In contrast with Olympus' optical head and Taylor's LCD apparatus, Appellant's claim 1 calls for the polarizer to be isolated by means of a cover sheet sealed to the polarizer's optically transparent substrate.

There is no teaching or suggestion in either Olympus or Taylor to have a cover sheet sealed to the substrate of a polarizer.

Accordingly, it is urged that the rejection is in error and should be reversed.

2. Is claim 2 unpatentable under 35 USC 103(a) over Olympus in view of Taylor and further in view of Shimizu?

Claim 2 is rejected under 35 USC 103(a) as being unpatentable over Olympus in view of Taylor and further in view of Shimizu.

The combination of Olympus and Taylor is said by the Examiner to disclose the invention, except for the feature that the polarizer is a wire grid polarizer, and Shimizu is said to teach the substitution of a wire grid polarizer for a conventional polarizer.

Shimizu shows a digital image projector with polarizing beam splitters. In the embodiment shown in Figs. 4 - 6, the polarizer is a wire grid polarizer. Shimizu states that there are certain problems with conventional digital image projectors employing reflective polarization modulators and conventional MacNeill-type polarizing beam splitters which employ multilayer dielectric polarizing film.

Shimizu does not explain what the problems are, but teaches that they can be avoided by employing a wire grid polarizing beam splitter. See col. 12, lines 25-30.

Since Shimizu's disclosure relates specifically to digital image projectors, and the problems with conventional polarizers are not explained, Shimizu provides no motivation or suggestion to the skilled artisan to substitute a wire grid polarizer for the film polarizer in Olympus' optical head for a disk drive.

Accordingly, it is urged that the rejection of claim 2 under 35 USC 103(a) over Olympus in view of Taylor and further in view of Shimizu is in error, and should be reversed.

3. Is claim 3 unpatentable under 35 USC 103(a) over Olympus?

Claim 3 is rejected under 35 USC 103(a) as being unpatentable over Olympus.

Claim 3 is similar to claim 1 in calling for an optically transparent cover sheet sealed to the optically transparent substrate of an environmentally sensitive polarizing element, but additionally calls for spacers and sealant around the periphery of the device between the cover sheet and the substrate.

The Examiner argues that while Olympus fails to teach any sealant between the substrate and the cover sheet, the use of such a sealant would have been obvious in view of the teaching of an air-tight enclosure.

However, it is not the use of sealant per se which is urged to be patentable, but rather the use of spacers and sealant together to seal the cover sheet to the substrate. This allows the use of planar sheets of material for the substrate and cover sheet, and still maintain a space for the polarizer, and also results in the isolation of the polarizing element from other elements which may be present in an assembly.

The claimed structure is neither taught nor suggested by Olympus.

Accordingly, it is urged that the rejection of claim 3 is in error and should be reversed.

4. Is claim 4 unpatentable under 35 USC 103(a) over Olympus in view of Shimizu?

Claim 4 is rejected under 35 USC 103(a) as being unpatentable over Olympus in view of Shimizu.

This rejection is in error for the same reasons advanced with respect to the rejection of claim 2, and accordingly should be reversed.

5. Are claim 5–7 unpatentable under 35 USC 103(a) over Kizawa?

Claim 5–7 are rejected under 35 USC 103(a) as being unpatentable over Kizawa.

Kizawa teaches an enclosure for monitor cameras. The enclosure (2) is composed of triangular walls fitted together to form the appearance of 'sharp design' (7, 8, 9). The monitor cameras are formed into a 'photographing device block' (3) which is provided **inside** the enclosure (2), to photograph images through a window (2f) in one of the walls. See, e.g., Fig. 2(c).

Kizawa fails to teach or suggest an enclosure with triangular top and bottom portions for form a wedge-shaped enclosure, as well as face portions having mounting apertures for optical elements, as called for by claim 5.

Moreover, Kizawa does not teach or suggest such a structure in which the face portions have a rectangular shape, as called for by claim 6.

The Examiner has acknowledged that Kizawa fails to disclose such features, but has urged that absent a showing of criticality, such would have been a matter of design choice and therefore obvious.

However, the test for patentability under Section 103 is whether the claimed invention would have been obvious to the skilled artisan in view of the teachings of the cited reference.

A finding of obviousness must be supported by some teaching or disclosure in the reference which would either teach or at least suggest the features claimed to be patentable.

Kizawa contains nothing which would teach or suggest a wedge-shaped enclosure with triangular top and bottom portions and rectangular face portions, and apertures for optical elements in the face portions. In fact, in teaching that all of the faces of his enclosure are triangular, and that only one of these faces has a window, Kizawa actually leads away from Appellant's claimed invention.

It is only with the aid of hindsight from Appellant's own teachings that the claimed invention becomes obvious, and such hindsight is not permitted in judging patentability under Section 103.

Accordingly, it is urged that the rejection of claims 5-7 under 35 USC 103(a) as being unpatentable over Kizawa is in error and should be reversed.

6. Are claims 8-10, 12 and 13 unpatentable under 35 USC 103(a) over Dreyer?

Claims 8-10, 12 and 13 are rejected under 35 USC 103(a) as being unpatentable over Dreyer.

Dreyer discloses a projector with a multiple lamp light source. In Fig. 9, Dreyer shows one embodiment of a projector in which various elements including a 'polarization modulating display 32, such as a liquid crystal display', are enclosed within a housing, and in which a projection lens 23 is apparently mounted in an aperture of the housing.

Dreyer does not disclose a sub-assembly for a display device comprising a sealable housing having first, second and third mounting apertures, a light polarizing element having an environmentally sensitive active surface, the light polarizing element sealed into the first aperture, a light modulator panel sealed into the second aperture and a lens sealed into the third aperture.

The Examiner has acknowledged that the reference has deficiencies, but has urged that absent a showing of criticality, all such deficiencies would have been obvious to the person of ordinary skill in the art.

However, as noted above with respect to the rejection of claims 5-7, the test for patentability under Section 103 is whether the claimed invention would have been obvious to the skilled artisan in view of the teachings of the cited reference.

A finding of obviousness must be supported by some teaching or disclosure in the reference which would either teach or at least suggest the features claimed to be patentable.

In this instance, Dreyer contains nothing which would teach or suggest a sub-assembly for a display device comprising a sealable housing having first, second and third mounting apertures, a light polarizing element having an environmentally sensitive active surface, the light polarizing element sealed into the first aperture, a light modulator panel sealed into the second aperture and a lens sealed into the third aperture.

It is only with the aid of hindsight from Appellant's own teachings that the claimed invention becomes obvious, and such hindsight is not permitted in judging patentability under Section 103.

Accordingly, it is urged that the rejection of claims 8-10, 12 and 13 under 35 USC 103(a) over Dreyer is in error and should be reversed.

7. Is claim 11 unpatentable under 35 USC 103(a) as being unpatentable over Dreyer in view of Shimizu?

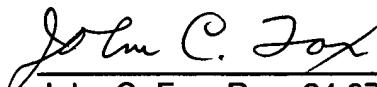
Claim 11 is rejected under 35 USC 103(a) as being unpatentable over Dreyer in view of Shimizu.

This rejection is in error for the same reasons advanced with respect to the rejection of claims 2 and 4, and accordingly should be reversed.

CONCLUSION

In view of the foregoing, Appellant respectfully requests that the Board reverse the rejections of record, and direct the Examiner to allow all of the pending claims, and to otherwise find the application to be in condition for allowance.

Respectfully submitted,


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APPENDIX

CLAIMS ON APPEAL

1. (Previously amended) A light polarizing device comprising:

 a polarizing element having an optically transparent substrate, an environmentally sensitive polarizing element on the substrate, and an optically transparent cover sheet sealed to the substrate and forming a sealed enclosure surrounding the polarizing element, the enclosure having a non-reactive atmosphere to protect the polarizing element from the ambient environment.

2. (Original) The light polarizing device of claim 1 in which the polarizing element is a wire-grid polarizing element.

3. (Original) A light polarizing device comprising:

 an optically transparent substrate, an environmentally sensitive polarizing element on the substrate, an optically transparent cover sheet, a plurality of spacers distributed around the periphery of the device and supporting the cover sheet on the substrate above the element, sealant extending around the periphery of the device between the substrate and the cover sheet, and non-reactive atmosphere filling the interior space between the substrate and the cover sheet and protecting the environmentally sensitive polarizing element.

4. (Original) The light polarizing device of claim 3 in which the polarizing element is a wire-grid polarizing element.

5. (Previously amended) A sealable housing for use in a sub-assembly for a display

device, the sealable housing comprising triangular top and bottom portions and three face portions extending between the top and bottom portions to form a wedge-shaped enclosure, the face portions comprising mounting apertures for optical elements.

6. (Previously amended) The sealable housing of claim 5 in which the three face portions are rectangular.

7. (Original) The sealable housing of claim 6 in which the top and bottom portions are right triangles each having two short sides and a long side, respectively.

8. (Previously amended) A sub-assembly for a display device comprising a sealable housing having first, second and third mounting apertures, a light polarizing element having an environmentally sensitive active surface, the light polarizing element sealed into the first aperture, a light modulator panel sealed into the second aperture and a lens sealed into the third aperture.

9. (Original) The sub-assembly of claim 8 in which the sealable housing comprises triangular top and bottom portions and first, second and third rectangular face portions extending between the top and bottom portions to form a wedge-shaped enclosure, the first, second and third mounting apertures being located in the first, second and third rectangular face portions, respectively.

10. (Original) The sub-assembly of claim 9 in which the top and bottom portions are right-triangles having two short sides and a long side, and the first face portion extends between the long sides of the top and bottom portions.

11. (Original) The sub-assembly of claim 10 in which the polarizing element is a wire-

grid polarizer.

12. (Original) The sub-assembly of claim 8 in which the light modulator panel is a reflective liquid crystal light modulator panel.

13. (Original) The sub-assembly of claim 8 in which the lens is a projection lens.